PROSODIC DOMAINS FOR SEGMENT DELETION

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1. Introduction. This paper attempts to outline the intrinsic relationship that can be discerned between prosodic domains and segmental processes Rather than being putative constituencies inferred from segmental behavior (cf especially Nespor & Vogel 1986, and Selkirk 1984), these constituencies are instead identifiable alternations of strong and weak syllables making up the suprasegmental contour Certain phrasal combinations in cooperation with phonological operations such as stress clash resolution preserve the reoccurrence of the domain as a favored rhythmic type This suprasegmental constituency, which defines the domain, serves as the determining environment for phonological operations commonly referred to as sandhi variation, e g *liaison* and *mute-e*, glide formation, and the location of pauses

These suprasegmental constituents, then, are realized in the form of a favored template of strong and weak syllables which by themselves, I argue, define the domain In many respects, this suprasegmental template is coincidental with what is called the Prosodic Word or at other times with what is termed the Phonological Phrase in Prosodic Phonology (cf especially Selkirk (1984) and Nespor and Vogel (1986)) There are several phenomena, however, which the Prosodic Word and the Phonological Phrase of classical Prosodic Phonology do not address and which according to the analysis proposed here can not account for, most notably the suprasegmental processes themselves

2. Suprasegmental Processes. Certain very important combinatorial processes in French will escape our notice if we continue to follow the current practice in Prosodic Phonology These processes involve especially the creation of stress configurations and how those stress configurations are adjusted as words are combined to compose larger groups and phrases Elsewhere (Mazzola 1992, 1993, 1994a & b, 1996, 1997), I have specified a patterning of French syllable groupings and have focused on the insights that can be gained from their suprasegmental characteristics This can be achieved by allowing for constituencies which are defined suprasegmentally and which are further distinguished by their import for the operations of the segmental phonology We begin by identifying typical lexical entries marked as **S, W S, W W S** with the **Suprasegmental Word** for French

S S
(1) voix 'voice', bleu 'blue'

W S W S
(2) bonheur 'happiness', truqué 'fake'

W W S W W S
(3) parapluies 'umbrellas', perforé 'punched'

while another prefered syllabic patterning, e g **S W (W) S** can be identified with what I will term the **Suprasegmental Group** This latter, the **Suprasegmental Group,** can be formed either through simple lexical compounding

s w s
(4) porte- bonheur 'good luck charm'
cartes truquées 'marked cards'
Porte-Maillot

s ww s
(5) porte-parapluies 'umbrella stand'
carte perforée 'punch card'

or through the insertion of schwa before a monosyllable to correct one form of stress clash

s w s
(6) porte-voix 'megaphone'
carte grise 'car registration'
ours[e] blanc 'polar bear'
film[e] noir

or through another version of stress clash resolution in French ---where schwa is not available --- by means of stress retraction obligatorily before monosyllables

w s s s w s
(7) bateau + mouche → bateau mouche 'sightseeing boat'
meilleurs + voeux → meilleurs voeux 'best wishes'

and optionally before polysyllables

w s w s s w w s
(8) a bateau + maison → bateau-maison 'house boat'

This process of retraction can only be applied to NP's made up of compounds and attributive phrases It is in this way, then, that lexical and morpho-syntactic information is delivered by means of patterns of syllable strength For predicative NP's, on the other hand, these same patterns of syllable strength are not realized in unmarked cases

w s w s s w w s
(8) b bateau français → *bateau français 'French boat'

w s s s w s
(8) c bateau moche → *bateau moche 'lousy boat'

The leftward retraction of stress in such cases seems rather to give the interpretation reserved for what is known as as the *accent d'insistence* or *accent d'intensité*

It should be emphasized in connection with the examples already given that syllables labeled above as strong for French are not equal in strength This is to say that the left-most strong syllable within a constituent designates secondary stress, while primary stress is reserved for the rightmost strong syllable I have claimed that French has secondary stress and that it is crucial for the observations and explanation of the phonological processes which are the focus of this paper For further discussion regarding the phenomenon of secondary stress in French, see Hoskins (1994 35-47), Mazzola (1992), Passy (1899 52-53), and Tranel (1987 199-200)

As a further indication of the importance of secondary stress in the formation of these patterns, I proceed to parse and label them as suprasegmental constituents as in (9) where we have two **Suprasegmental Words** combining in conformity with the template to give a **Suprasegmental Group**

(9) **[ws]SW + [s]SW → [s w = s]SG**
petit homme petit = homme 'little man'

(10) **[ws]SW + [w s]SW → [w[s = w s]SG]**
petit ami petit = ami

[s w = w s]SG
OR petit = ami 'boy friend'

From this compounding of **Suprasegmental Words**, then, we see the formation of **Suprasegmental Groups** which display the restructuring shown in (10) Thus, (9) illustrates the creation of a **Suprasegmental Group** as a result of stress retraction, while (10) illustrates the creation of two possible **Suprasegmental Groups** Thus, the first output in (10) is the result of restructuring, i e the configuring of a new constituent starting with the first strong syllable, giving **[S W S]** preceeded by a single orphaned, weak syllable This, however, presents us with a violation of the Strict Layer Hypothesis (cf Selkirk 1984) If we were to apply Strict Layering, we would not be able to observe that in such an environment the weak syllable in question may not be realized segmentally The second output in (10) is achieved through the optional stress retraction before polysyllables within attributive phrases Since schwa in this case is in a strong syllable, it is fully targeted for surfacing As discussed in Mazzola (1994), the **Suprasegmental Group** in this way is revealed to be the environment for the liaison consonant in French (indicated by the symbol "=" in (10) above) This method of determining patterns of syllable strength with the resultant restructuring in (10) allows for the formation of the **Suprasegmental Group**, now freed from lexical and syntactic strictures, out of the material provided by **Suprasegmental Words**

Similarly, with regard to the occurrence of mute-e, we can observe for (6) given above, repeated here as (11)

[s w s]SG
(11) porte-voix 'megaphone'
carte grise 'car registration'
ours[e] blanc 'polar bear'
film[e] noir

that the compound is contained within a **Suprasegmental Group**, for which the insertion of the schwa is required For (4), however, reproduced here as (12)

[s w s]SG
(12) porte- bonheur 'good luck charm'
cartes truquées 'marked cards'
Porte-Maillot

and (5), given again as (13)

[s ww s]SG
(13) porte-parapluies 'umbrella stand'
carte perforée 'punch card'

no schwa is inserted since the phrase already conforms to one of the two favored templates of syllable stress patterns We see the same phenomenon in seemingly unrelated items exemplifying the behavior of schwa as in (14)

[s w s]SG
(14) a l'oncle de Paul 'Paul's uncle'

[s w ws]SG
b l'oncle de Pauline 'Pauline's uncle'

[s w w s]SG [ws]SW
c l'oncle de la petite Pauline 'little P's '

Here, we see always the absence of the first schwa in the sequence, but not because of the increasing number of syllables following it as it would appear from (7), (8), and (9), but rather by virtue of it's being unnecessary, since we have a phrase within which one of the two favored configurations of syllables must be preserved For exactly the same reason, the schwa in the word petite in (14c) is deleted in order to reduce the length of the phrase to conform to the pattern of syllable strength

Above it was observed that stress retraction can occur with compounds and attributive noun phrases, exemplified once again in (15a) and (16a) Such a phenomenon seems not to take place, however, with predicative noun phrases, cf (15b) and (16b)

[ws]SW [s]SW [s w s]SG
(15) a petit + homme → petit homme 'little man'

[w s]SW [s]SW [s w s]SG
b bateau + moche → *bateau moche 'lousy boat'

[ws]SW [w s]SW [s w w s]SG
(16) a petit + ami → petit ami 'boyfriend'

[w s]SW [w s]SW [s w w s]SG
b bateau + français → *bateau français 'French boat'

In this way we can see that attributive phrases can be made into **Suprasegmental Groups** as in (15a) & (16a) via stress retraction, but predicative phrases can not (cf (15b) & (16b)) The latter must retain

their status as sequences of **Suprasegmental Words** and this must be reflected in their representation of syllable strength There must be some instruction, therefore, originating in the syntax --- since all the phrases in (15) & (16) are noun phrases --- which signals this fact However, because they are all noun phrases, there must be some other tag, no doubt related to the morphology, which completes this instruction Thus, there must be some instruction to the effect that the final lexical stress on adjectives can be retracted to avoid stress clash, but the final stress of nouns can not For this reason, we see that there is an interface of the phonological phrase not only with the syntax, but with the morphology as well (cf also Morin & Kaye 1982, and Mazzola 1993, 1994b)

This early relationship between the phonology and the syntax can be exemplified further (17) and (18)

(17) a **[[s]SW [s]SW] [w s]SW**
livre d'art chinois →

[s w s]SG [w s]SW
b livre d'art chinois "Chinese art book"

[s]SW [s w s]SG
(18) a livre d'art chinois →

[s w w s]SG
b livre d'art chinois "book on Chinese art"

In these examples taken from Dell (1973), the schwa in (17), so noticeable in contributing to the distinction between items (17) and (18), is inserted to remove the stress clash by forming the **Suprasegmental Group** as given However, the constrastive parsing for both examples must have already been present for the insertion to have taken place for (17a), but not for (18a) The stress clash for (18) is resolved by limiting strong syllables only to the beginning and the end of the constituent, thereby bringing the phrase into line with the template of the **Suprasegmental Group** The potential environment for schwa insertion in (18a), identical to that in (17a), remains, therefore, unfilled For this reason, stress clash resolution whether through schwa insertion or through stress retraction must be considered to occur during restructuring In the process, there may occur further modifications on the suprasegmental configuration of the phrase, i e restructuring, due to the resolution of stress clash resulting in the creation of a new constituent as in (18b) This results in the formation of a larger **Suprasegmental Group**, one within which, given the preservation of the favored template, there is no need for the realization of the schwa For (17a), on the other hand, the clash is resolved through insertion

We, therefore, have both the realization of the liaison consonant and suprasegmental operations dependent, but only remotely, on the parsing handed down from the syntax From these suprasegmental processes is derived a determination of stress clash with a resulting modification in the configuration of strong and weak syllables This operation, as shown in (18b), feeds in a crucial way possible changes in constituent structure and ultimate parsing In this way, the distinctive intonations of the phrases --- as well as the behavior of the sandhi variant --- can be viewed as the vestiges of the earlier parsing function of the syntax However, syntactic constituents, I argue, pass on their relationships in the form of metrical phrasing It is in turn this phrasing which is modified to form the phonological environment for the insertion of segments

3 Location of Pauses. Especially important for further study in this regard is the relationship of these data with the phenomenon of **pause** within the phrase It is not surprising, for example, that in the phrase

(19) [s w w w s] ‖ [w w s]
professeur de droit ‖ canadien "Canadian law professor"

the pause occurs at a syntactic boundary For the phrase in (20), however, the pause is entirely unrelated to the syntax

(20) [ww s] w ‖ [s w w s]
professeur de ‖ droit canadien "prof of Canadian law"

My contention is that this is purely the result of the intonational (= rhythmic, = prosodic) constituency which acts as the domain for this operation and that this is the by-product of the orientation which views sandhi-variation as a function of prosodic constituency

4 Glide Formation Hannahs (1995) has focused on the question of glide formation in French whereby high vowels become corresponding glides when followed by another vowel

(21) colonie	→	colonial	'colonial'
attribut	→	attribuable	'attributable'
joue	→	jouable	'playable'

Glide formation takes place word internally as in (21) between a stem and suffix, but it does not typically apply across words

(22) j'envie Alain	'I envy Alain'
je joue au football	'I play soccer'
il a dû attendre	'he had to wait'

However, Glide Formation does not occur word-internally (a) between prefixes and stems, e g anti-, semi-, and (b) between members of a compound as in (23)

(23) antialcoolique	'antialcoholic'
tissue-éponge	'terry cloth'

Hannahs concludes from these data that glide formation occurs within Prosodic Words, as in (21), but not between Prosodic Words, as in (22) and (23) Thus, prefixes and members of compounds in (23) are Prosodic Words

In this connection, Hannahs cites Wetzels observation that "stress rather than the P[rosodic] W[ord] boundary *per se*, is responsible for blocking G[lide] F[ormation] That is that a stressed high vowel does not become a glide even when followed by another high vowel " Hannahs counters by allowing that "this may be a correct characterization of why GF is blocked at the end of a PW - that the PW defines a domain of stress assignment in French and that the final vowel in such a domain is stressed" (1995 1132)

This raises the issue of the suprasegmental characteristics of the Prosodic Word Viewed from the perspective outlined in this paper, even if we equate the Prosodic Word with the **Suprasegmental Word**, we can give the following representation

(24)
```
[ w s] [ w  ws   ]     [  w[sw  ws  ]
 anti  +  alcoolique  →    antialcoolique

[ w s ][  w s ]          [  w[s  w s  ]
 tissue +  éponge        →    tissue-éponge
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We see once again a restructuring to conform to the characteristic template of the **Suprasegmental Group**, no longer determined by the lexical or morphological structure Here rather, we have the suprasegmental constituent, in violation of the Strict Layer Hypothesis because it is preceded by a single orphaned weak syllable Its function, instead, is an essentially rhythmic one which is performed by beginning with a strong syllable to initiate the definition of the Group For that reason, it can not be reduced to a weak syllable, thereby blocking glide formation in both instances

The same restructuring prevails in the items given in (22), reproduced here as (25)

(25)
```
[  w s]  [  w s]     [  w[s  w  s  ]
 j'envie  +  Alain  →    j'envie Alain

[ w  s ][ w  w s ]    [ w[s   w  w s  ]
 je joue  au football →   je joue au football

[ww  s] [ w s   ]     [ww  [ s ws   ]
 il a dû   attendre  →   il a  dû attendre
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The presence of the template is not favorable to the reduction of the full vowel to a glide as it is in the examples given in (21), reproduced here as (26)

(26)
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 ww s    s          ww w   s          ww s
 colonie + al   →   coloni + al   →   colonial

 w ws    s          w ww   s          w w s
 attribut + able →  attribut + able →  attribuable

  s      s          w      s            s
 joue + able    →   jou + able    →    jouable
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Here, we see again the stress clash that must be resolved during the lexical compounding itself to form the **Suprasegmental Word** Glide Formation takes place as the result of the weakening of the first strong syllable in the compound

5. Conclusion. Accentual patternings exist to define favored configurations of syllables which can be identified as constituents of rhythmic structure This rhythmic structure, while initially informed by syntactic constituency, is modified through purely phonological operations, e g stress clash resolution, in order to give shape to the suprasegmental phrasal phonology It is this phrasal phonology,

defined by its characteristic constituency, which serves as the immediate domain for determining the behavior of sandhi segments, as well as glide formation and the location of pauses The workings of the suprasegmental constituency determining this behavior and the insights gained thereby would be largely obscured by a rigorous application of the Strict Layer Hypothesis For this reason, the Strict Layer Hypothesis should not be considered to apply to these phenomena which should rather be seen as functions of a nimble and fluid, but uniform, suprasegmental constituency

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